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February 1, 2008

To: Lou Anne Clement
Director, Tewksbury Board of Health
From: Brad Mitchell
Director, Division of Biosecurity and Regulatory Services

RE: Krochmal Farms - Standard Agricultural Practices

Background

The Department of Agricultural Resources was asked by Representative Miceli's office and the Tewksbury Board of Health to provide input on whether Krochmal Farm was following *standard agricultural practices* in relation to its swine operation. As I understand, the request has come from the Board of Health due to numerous complaints about odors from neighbors of the farm.

Standard agricultural practices are those agricultural activities that are commonly accepted and employed across agricultural settings at a given period of time.

DAR has no regulatory authority over this operation relative to odors. The Department does have authority over animal health on the farm. The farm is currently in compliance with all applicable DAR requirements.

DAR does have limited authority over commercial compost operations through a memorandum of understanding with the Department of Environmental Protection. This authority only extends to those operations that bring materials onto the site for composting. BMC Composting, a separate entity from Krochmal farms, does lease property from Krochmal Farm for commercial composting.

At the request of Representative Miceli's office, a DAR employee has been periodically monitoring the area around the farm and compost site for odors. Several visits were made to the vicinity of the farm and BMC Composting site. This employee did not note any significant odors associated with the farm or compost site. This fact neither confirms nor refutes allegations made by neighbors.

Assessment

Several DAR employees visited the site on the morning of November 7 to view the farm operation in order to make an assessment relative to whether practices at the farm fall within *standard agricultural practices*. Only the piggery operation was viewed. Members of the family who own and run the operation, Tewksbury Board of Health staff, and a representative of the US Department of Agriculture, Veterinary Services, accompanied them.

Facility

There was little to no odor at the time of the visit, even in close proximity to the animals. The weather was, and had been relatively cool.

At the time of the visit, Krochmal had approximately ----- animals in the barn. This is a building designed for swine, with slat openings in the floor through which waste flows into a “basement” containment area. The holding capacity is approximately 500,000 gallons. The farm owner estimated that approximately 100,000 gallons were present during the visit. Waste is removed from the containment area via pump, at the far end of the facility. It is designed so that waste may be pumped into a truck or other vessel.

The waste storage area was not an open lagoon. Gasses resulting from microbial digestion of waste materials escape both into the barn area via the slat openings in the floor and via the opening from the pump apparatus. Large fans vent the barn area as dictated by animal needs.

The barn is of relatively new construction and of a design that is standard in the swine industry, although not prevalent in Massachusetts where pig farms are generally smaller. It is of a size and construction suitable for the number of animals housed within it. The slat floor and containment system is common within the swine industry for farms of this size.

The building itself is designed, built and maintained (at the point at which DAR visited) in a manner consistent with *standard agricultural practices*.

Manure Storage

As stated previously, manure is stored beneath the barn. This is standard in swine operations of this size. It is not uncommon to store large amounts of manure at any given time, especially during winter months where the ground is frozen and manure should not be spread. Prolonged storage may also occur when cropland is unavailable for spreading, due to the presence of crops.

Manure storage at Krochmal farm is consistent with *standard agricultural practices*.

Disposal of Manure

It is DAR’s understanding that manure is pumped from storage into trucks where it is brought to fields and spread on land used to grow both hay and pumpkins. The farm is limited in the ability to spread when these crops are actively growing or when weather is inclement. They have adequate storage facility for these periods. There is no indication storage capacity has ever been exceeded, with manure being stored or disposed of improperly.

While it is not a requirement under either federal or state law, it is advisable that manure and other nutrients be applied under a Nutrient Management Plan. Such a plan essentially ensures that nutrients applied to fields do not exceed agronomic rates – those that are beneficial to crops and not harmful. In close proximity to groundwater, over application of manure can lead to nitrate leaching.

The disposal of manure as described by the owners of Krochmal Farm is consistent with agronomic practices. Nutrient management plans are rapidly becoming standard where manure is spread on cropland.

Considerations in Reducing Odor

While all the activities of the farm witnessed by, and described to DAR fall within the confines of standard agricultural practices, there are a number of changes the farm can undertake. It is important to note that the farm recognizes this. They expressed to DAR their willingness to make changes in their operation in order to reduce odors. They had clearly been considering such change and have already begun to implement these changes.

Odor from manure occurs because various gasses are released during microbial degradation of the manure. There are a number of factors that influence the amount of odor. It is a combination and interplay of these factors that ultimately determine how much odor may result:

- *Amount* - the more manure there is, the more potential there is for the release of gasses.
- *Stage of Microbial Degradation* – during digestion of manure, the release of gasses will be highest during peak microbial activity. The rate by which gasses are released by manure is dependent on various conditions including temperature and the amounts and types of microbes.
- *Types of Microbes* – there are generally two types of microbes involved in degradation – *anaerobic and aerobic*. Anaerobic microbes tend to produce more noxious odors. Unfortunately, it is difficult and unusual to promote aerobic degradation in situations where large amounts of liquid manure are stored.
- *Weather* – certain weather conditions (namely inversions) may cause gasses to linger and build up in a given area.
- *Timing* – disturbing stored manure, including transport and spreading, will often release gasses and odors.
- *Activities* – Activities that entail disturbing stored manure will result in the release of gasses.

Amount – It is the perception of the farm owners that the odor complaints were highest when the manure storage area was more than 20% full. There is logic to this observation as the more manure there is, the more potential there is for gas and associated odors to be produced. The farm owners stated to DAR that it was their intention to remove manure from the storage area on a weekly basis, or every other week at most. This may not be practical during winter months when manure cannot be spread on fields.

Stage of Microbial Degradation – While extremely difficult to predict and control, care should be taken not to disturb stored manure during peak periods of microbial activity as this may release considerable odors. Temperature likely has the most influence on this factor with high microbial activity occurring during times of high temperatures. This should be considered when determining the frequency during which the storage area is emptied. During certain periods of hot weather, it may be preferable to empty the storage area less frequently.

Types of Microbes – At the time of the DAR visit, the farm was adding a commercial product (Micro-Lift Hog) containing bacteria to the manure storage. This is an enzyme product designed to aid in the degradation of manure. It is our understanding that the farm has contracted with a consulting firm that will help them manage the microbial makeup of the manure pit in a manner that will minimize odors. Short of this, the farm should consult with the manufacturer of the product they may be using to ensure they are using it in a manner that will minimize odors.

Timing – Activities that involve stored manure being disturbed will often result in the release of odors. These actions include – pumping out the storage, transport, and spreading...

Weather – Activities that result in stored manure being disturbed should be avoided during periods when inversions are likely. Inversions are phenomena when a layer of cool air at the surface is trapped (or capped) by a layer of warm air above it. This restricts the vertical movement of air as well as the dispersion of odors.

Recommendations

At the urging and request of both Representative Miceli's office and the Director of Public Health, DAR suggests that the actions listed below be considered in efforts to reduce odors. The farmers who own and run Krochmal farms made many of these suggestions. It is important to understand that there is some degree of trial and error involved in strategies to reduce odor. It may take some period of time for the farm to determine the correct mix of strategies to reduce odor. It is equally important to realize that it is not likely to be feasible to eliminate odors from a pig farm. However, DAR is confident that the correct mix of the recommendations listed below will significantly improve the situation. Recommendations include:

- Efforts should be made to remove manure from the storage area weekly, or every other week. This may not be feasible when the ground is frozen or during extended periods of inclement weather.
- The pumping, transport and spreading of manure should take place on weekdays, during normal business hours when the majority of residents are not home.
- The existence or likelihood of conditions that favor thermal inversions should be considered before pumping, transport or spreading of manure takes place.
- The farm should contact the USDA Natural Resource Conservation Service to develop a nutrient management plan that will ensure that manure is not spread above agronomic rates.
- Upon spreading, manure should be immediately incorporated into the soil to the greatest extent possible.
- The farm has been adding a bacteria-based product to stored manure to assist in the management of manure and associated odors. It is suggested that the farm obtain expert guidance on such activities from a knowledgeable Extension Service, or private consultant (*DAR understands that Krochmal farm has already secured the services of a consulting firm who specializes in this area*).
- Manure should not be spread on frozen ground or during rain events. It has been observed that odor complaints increase as the amount of stored manure increases. Low temperatures should help to keep odors low. Nonetheless, alternative means of disposal should be explored that will allow for the frequent removal of stored manure during winter. Options to consider include:
 - Treatment at a sewage disposal facility. DAR does not have information on whether this option is financially feasible or whether farm waste would be accepted.
 - Composting. The farm can compost manure either on site or at a commercial composting facility. Compost should be managed properly to ensure aerobic degradation predominates. If taken to an offsite facility, it must be properly permitted through DEP or DAR as required.